

REMARKS

Claim Amendments and Status

Claim 51 has been amended. In view of the amendment to claim 51, claims 60 and 61 have been cancelled without prejudice. New claims 62-72 are being presented in this amendment. Claims 51-59 and 61-72 are pending.

Claim Rejections - 35 U.S.C. § 103

In the office action mailed on July 7, 2003, claims 51-54 and claims 59-61 have been rejected as allegedly being unpatentable under 35 U.S.C. § 103 over U.S. Patent No. 5,920,319 to Vining et al. in view of U.S. Patent No. 5,319,549 to Katsuragawa et al.

Claim 51 is directed to a method for performing computer aided diagnosis on a 3D, volumetric representation, of a region of interest. Specifically, the method includes the step of analyzing voxels representing a surface of a region of interest for a textural feature that is indicative of an abnormality. This aspect of the claimed invention is discussed in the specification from page 77 through page 81. For example, as noted on page 78 of the specification of the present application, a region of interest of healthy tissue may present a generally uniform surface texture. However, if a tumor is present, the region of the potential tumor may manifest itself as a disturbance or "noisy region" in the otherwise uniform texture. The present invention recognizes this phenomenon and applies it in connection with the analysis of a volumetric representation of a region. It is respectfully submitted that neither Vining nor Katsuragawa teach or suggest the claimed invention, either alone or in combination.

From the stated rejection of claim 51, there does not appear to be a citation to the use of textural features of a volume based representation of a region of interest which is indicative of an

abnormality. In this regard, it is respectfully submitted that Vining et al do not teach or suggest identifying a textural feature or using a textural feature to detect an abnormality.

The Katsuragawa reference is directed to the analysis of 2D radiograph image data. While the Katsuragawa reference discusses "lung textures in digital chest radiographs" (Col. 1, line 19) it is respectfully submitted that this discussion is in reference to a characteristic of the 2D image data rather than the texture of a surface within a 3D volumetric representation of a region of interest, as presently claimed. Thus, Katsuragawa does not teach or suggest the limitations of claim 51, either alone or in combination with Vining.

Further, even if the elements of claim 51 could be found in the combination of Vining with Katsuragawa, it is respectfully submitted that such a combination to arrive at the presently claimed invention would not be proper, since there is no motivation to combine the teachings of the references. In Katsuragawa, a 2D image of a lung with varying opacity is digitized and the digitized 2D image data is analyzed. There is simply no teaching in either Vining or Katsuragawa as to the applicability of the methods disclosed in Katsuragawa to a 3D, voxel based representation of a region of interest. Absent a motivation to combine these references, one cannot arrive at the presently claimed invention based on the cited references.

Claims 52-54 and 59-61 each depend from claim 51 and are patentable at least by reason of this dependency.

With respect to claims 52-54, in addition to the reasons set forth above with respect to claim 51, it is respectfully submitted that the references of record do not teach or suggest that the textural feature is included in a probability density function characterizing a correlation between two voxels of the portion of voxels, as presently claimed. As noted above, Vining does not disclose the use of textural features. Further, Vining does not disclose the use of probability

density functions (PDF) to characterize a correlation between two voxels. The citation for this proposition that is set forth in the office action to Vining (Col. 9, lines 50-55 and Col. 5, lines 15-23) simply does not teach or suggest this limitation. In column 9, Vining discloses imaging a high density material, such as bone, but does not disclose the use of a PDF to characterize a correlation between voxels. The reference in Col. 5 of Vining referring to "low density" is referring to a property of a contrast agent that is ingested by a patient, not a characteristic of the image data and certainly not a PDF associated with the image data. It is respectfully submitted that there is no reference to use of a PDF to characterize a correlation between voxels in this cited sections of Vining. It is respectfully submitted that Katsuragawa et al., which does not disclose the use of voxels, also fails to provide any disclosure in this regard. It is respectfully submitted that claims 52-54 are patentably distinct over the art of record.

Claims 55-58 have been rejected under 35 U.S.C. § 103 over U.S. Patent No. 5,920,319 to Vining et al. in view of U.S. Patent No. 5,319,549 to Katsuragawa et al., and further in view of U.S. Patent 6,125,194 to Yeh et al. The Yeh et al reference does not teach or suggest the use of textural features to assist in the diagnosis of abnormalities. Therefore, the Yeh et al. reference does not cure the noted shortcoming of Vining in view of Katsuragawa. Accordingly, claims 55-58 are patentable at least by virtue of their dependency on claim 51.

In addition, claims 55-58 recite additional patentable subject matter which is neither taught nor suggested by the art of record. For example, claim 55 recites that "a plurality of voxel intensities are used to generate a cumulating distribution function of the region of interest and a local cumulating distribution function, and wherein the local cumulating distribution function is compared against the context cumulating distribution function to identify regions of abnormality." In this regard, a context cumulating distribution function and a local cumulating

distribution function are calculated and compared in order to detect an abnormality. This is not taught or suggested by the art of record. Further, claim 56, which depends from claim 55, further recites determining a distance between the local cumulating distribution function and the context cumulating distribution function. Again, this feature is not taught or suggested by the art of record. Accordingly, claims 55-58 are patentable over the art of record.

New claims 62-72 contain all of the limitations of claims 51-61, respectively, and include an additional element in that analyzing for abnormalities includes both "a geometric feature and a textural feature indicative of an abnormality." These claims are patentable over the art of record at least for the reasons set forth above.

In view of the amendments and remarks set forth above, favorable consideration and allowance of claims 51-59 and 62- 72 is respectfully solicited.

Respectfully submitted,



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